Rhinelander Compressor Station

PSCW Pipeline Safety Conference

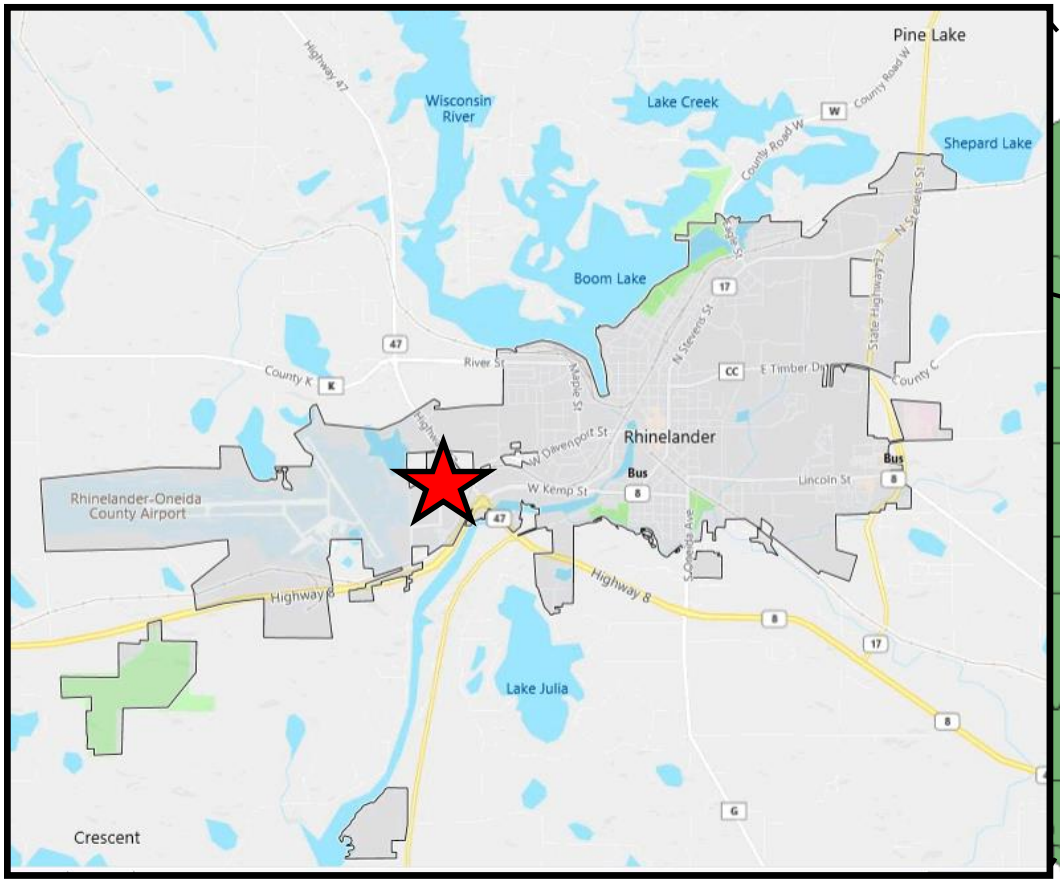
February 7, 2024

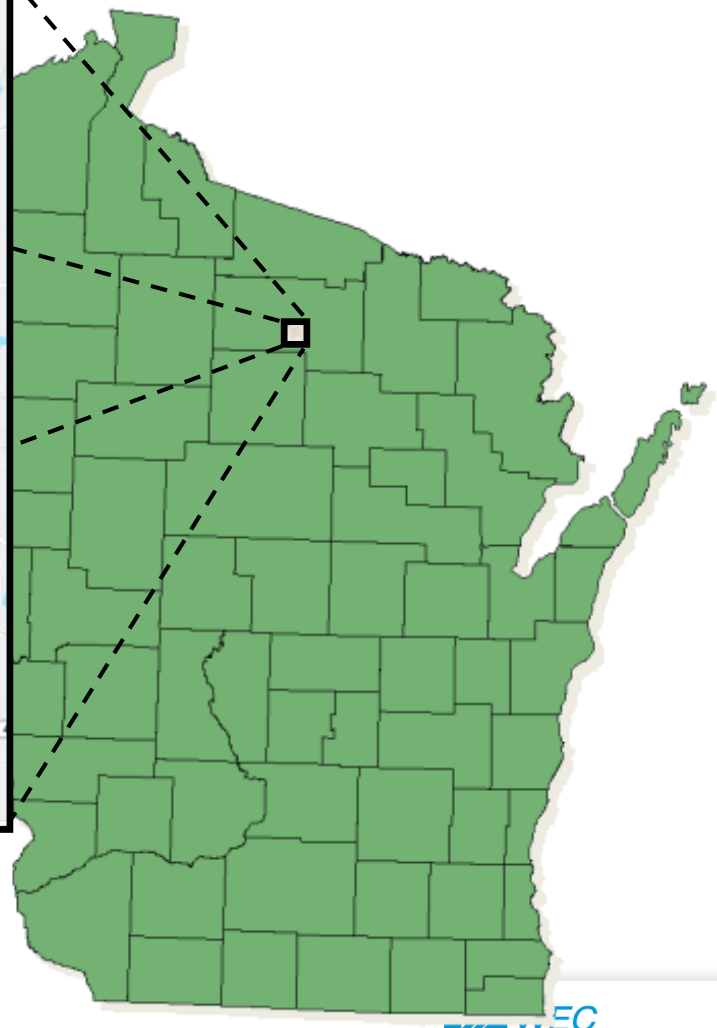
Agenda

- Need/Justification
- Project Execution/Schedule
- Siting
- Compressor Station Layout/Process
- Selection of Technology
- Other Major Design Decisions
- Compliance/Training
- Operating Plan
- Pictures
- Open Discussion/Questions

Need/Justification

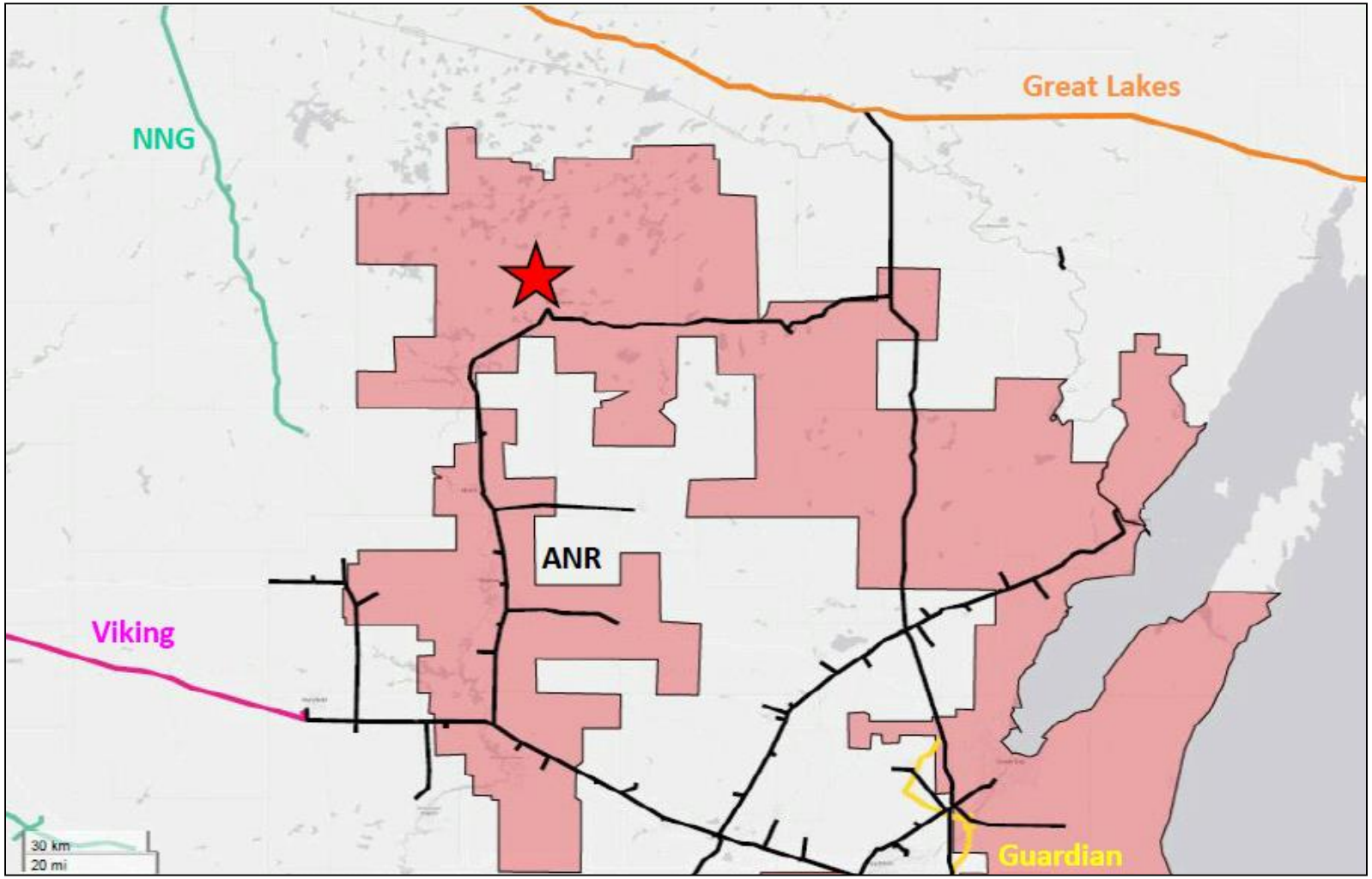
Oneida County (WPS Territory)





Need/Justification

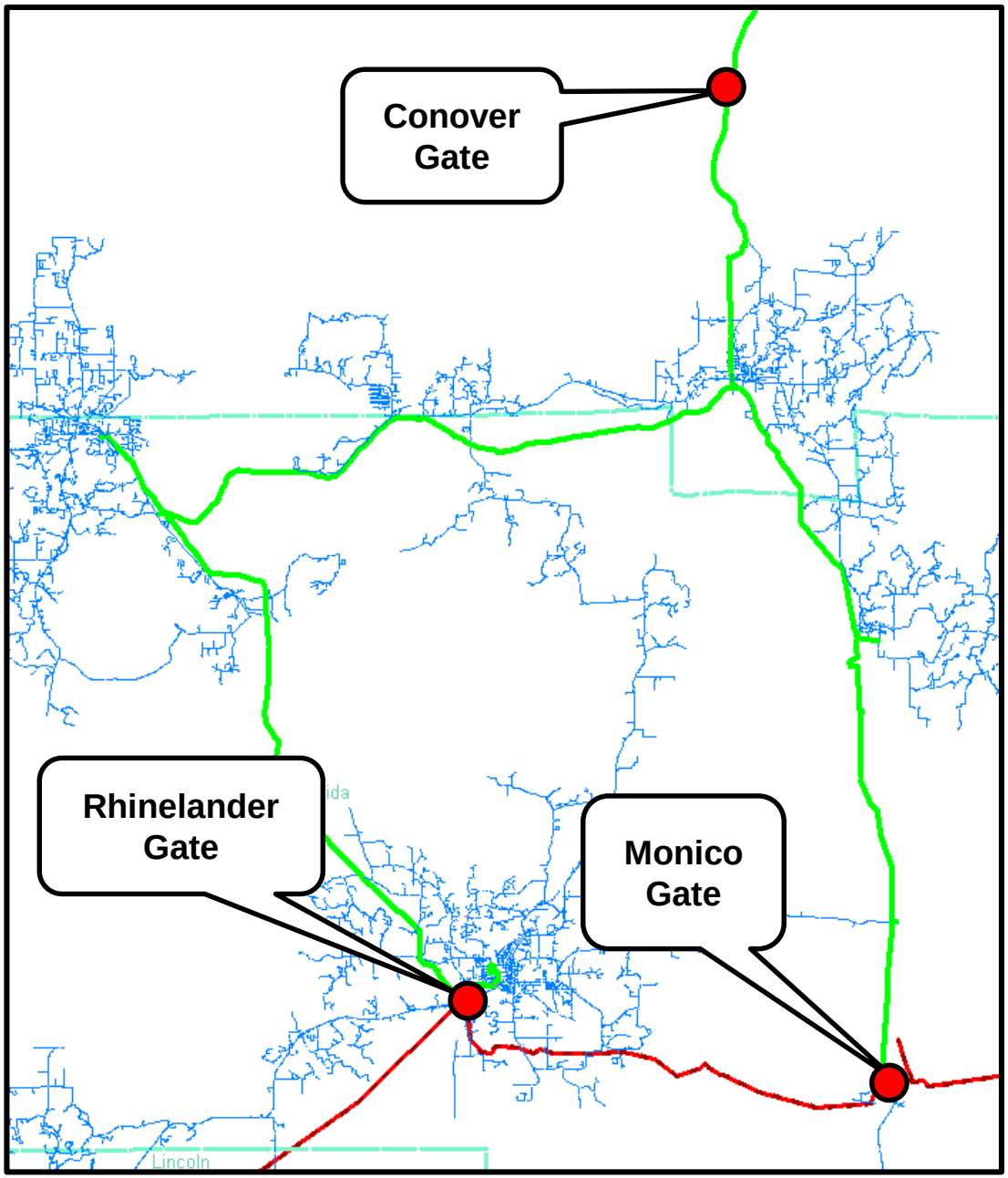
Northern WI Gas Supply



Need/Justification

WPS System

- 3 Feeds
  - Monico Gate (ANR)
  - Conover Gate (Great Lakes)
  - Rhinelander Gate (ANR)



Need/Justification

Gas Supply Capacity

- Capacity
  - Rhinelander has a growing need for capacity to cover peak demand. Growth in the area has led to this over the years, resulting in numerous requests to ANR, but results were cost prohibitive

- Rhinelander is dual served by ANR and Great Lakes pipelines
  - Great Lakes cannot support additional capacity to this area because they cannot provide a pressure guarantee. We have a bottleneck between GL and our largest customer base as well
  - ANR is closer in proximity to the system demand
    - **Can provide additional capacity, but at lower pressure guarantee.**

Need/Justification

Alternatives

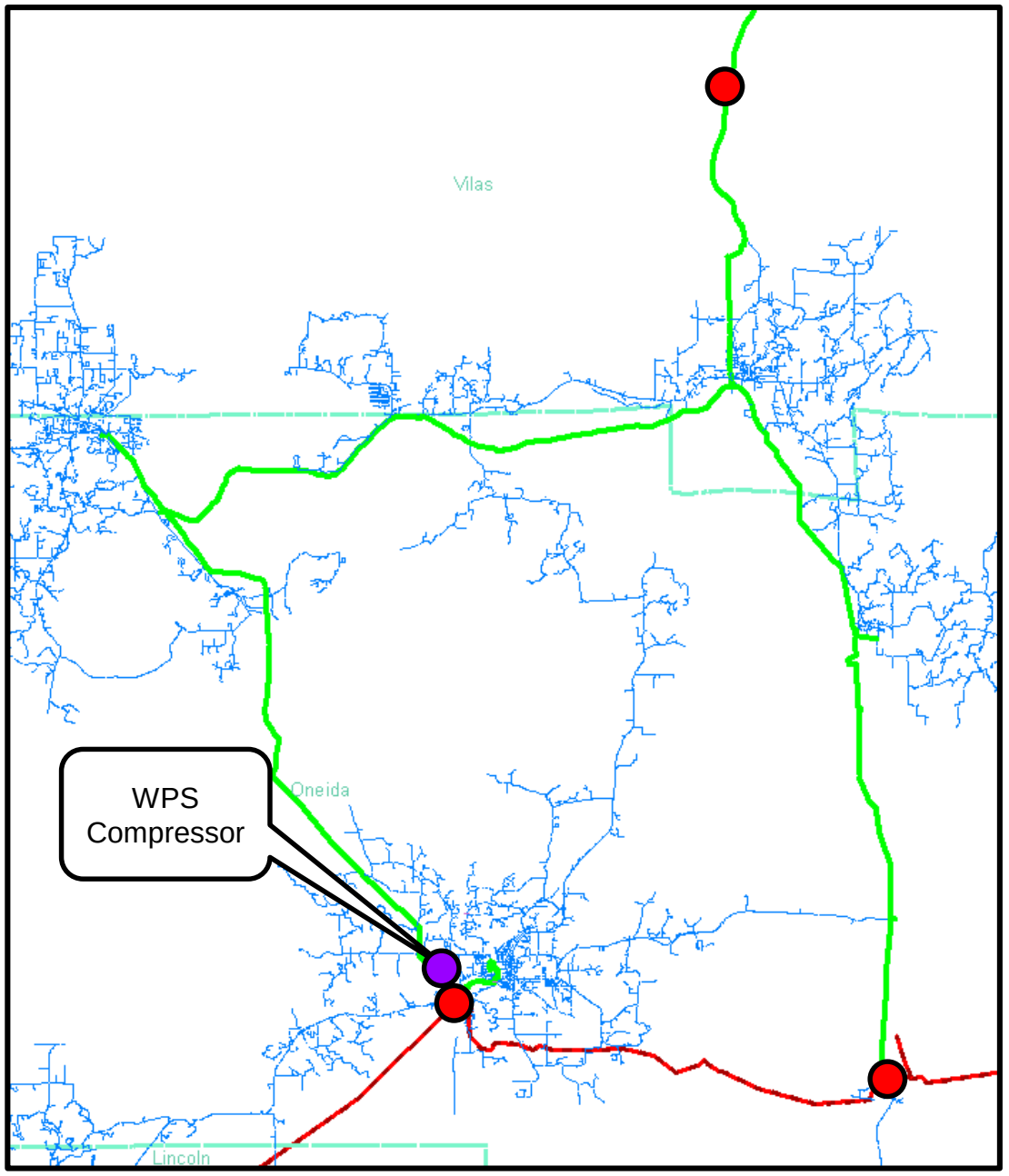
Five alternatives were evaluated to solve the capacity needs

- Do Nothing – Would result in failure to reliably serve customers
- Replace/parallel existing transmission system with larger pipe – initially preferred solution, but construction obstacles result in high price
- Interstate pipeline increase capacity of their system - Evaluated numerous times over the years, very costly for size of customer base
- Have Interstate pipeline build/operate compressor at interconnect – Pipeline not willing - financial, accounting and regulatory issues
- Build utility owned/operated compressor on utility transmission loop – Surfaces as low cost option

Need/Justification

Selected Alternative: WPS Compressor

- Scope ($17.3M)
  - WPS compressor station
- Recommended
  - Least cost option while increasing capacity
  - Provides operational flexibility for future growth



PSCW Process

- Why?
  - Project costs exceed the PSCW threshold for a natural gas project, requiring a Certificate of Authority (CA)
- What?
  - CA Application
    - Project Overview
    - Justification
    - Project Costs
    - Community Impacts
    - Natural Resource Impacts
- How Long?
  - Filed: August ‘21
  - Data Requests: June / July ’22
  - Order: August ‘22

Project Execution

- 1st Compressor Station in WEC-WI System
  - No in house expertise
  - Not a typical Regulator Station Project
    - More complex
    - Ancillary equipment that we are not well versed in
    - Unfamiliar start-up and performance testing requirements
    - No OQ tasks already set up for operating or maintaining compressor station

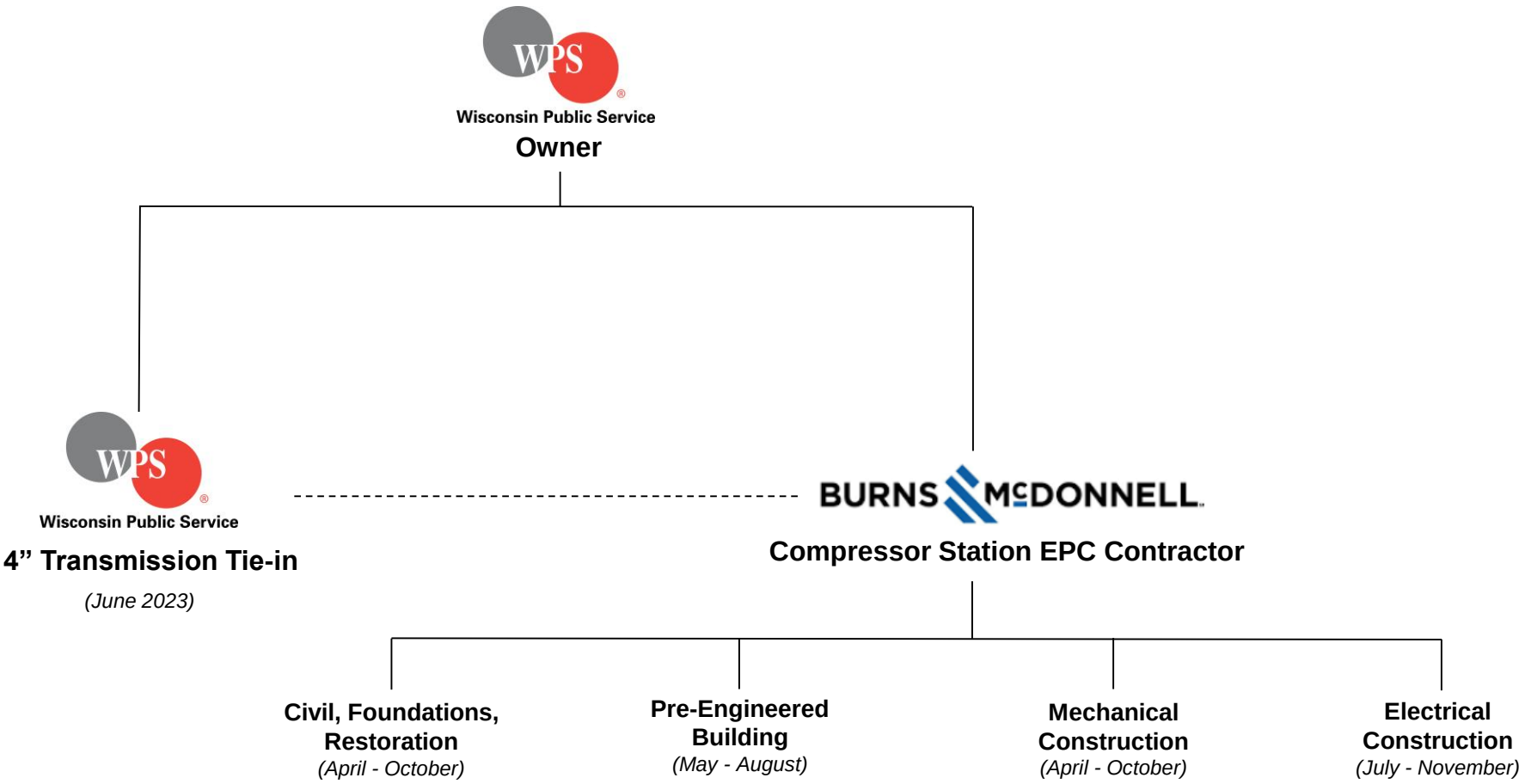
Project Execution - Options

- Internal Design and PM/CM
  - Similar approach to station design work
  - All aspects performed in house including equipment selection, design, procurement, CM, start-up, and testing
- Owner's Engineer Only
  - AE Firm provides technical support only
  - Procurement, CM, Start-up, Testing performed internally
- EPC (Eng-Procure-Construct) Approach
  - Various models
  - Company works with AE Firm to develop scope and estimate
  - Estimate used as basis for EPC contract
  - Typically includes incentives for achieving budget or better and dis-incentives for going over budget (+/- 10% bandwidth)

Project Execution – Selected Approach

- Open Book EPC Approach (Cost Reimbursable with Incentives)
  - EPC Firm executes turn-key project based upon jointly developed scope and estimate.
  - EPC Firm provides all technical, procurement, contract management, and construction resources.
  - Company has seat at the table in selection of preferred vendors and contractors as well as bid analysis.
  - EPC Firm is responsible for integration of all equipment and contract and performance management of those contracts.
  - Puts the overall management and risk with those who have the technical expertise.
  - EPC Firm is responsible for all performance requirements being met.
  - Partnership where both reap potential benefits.

Project Execution - Organization



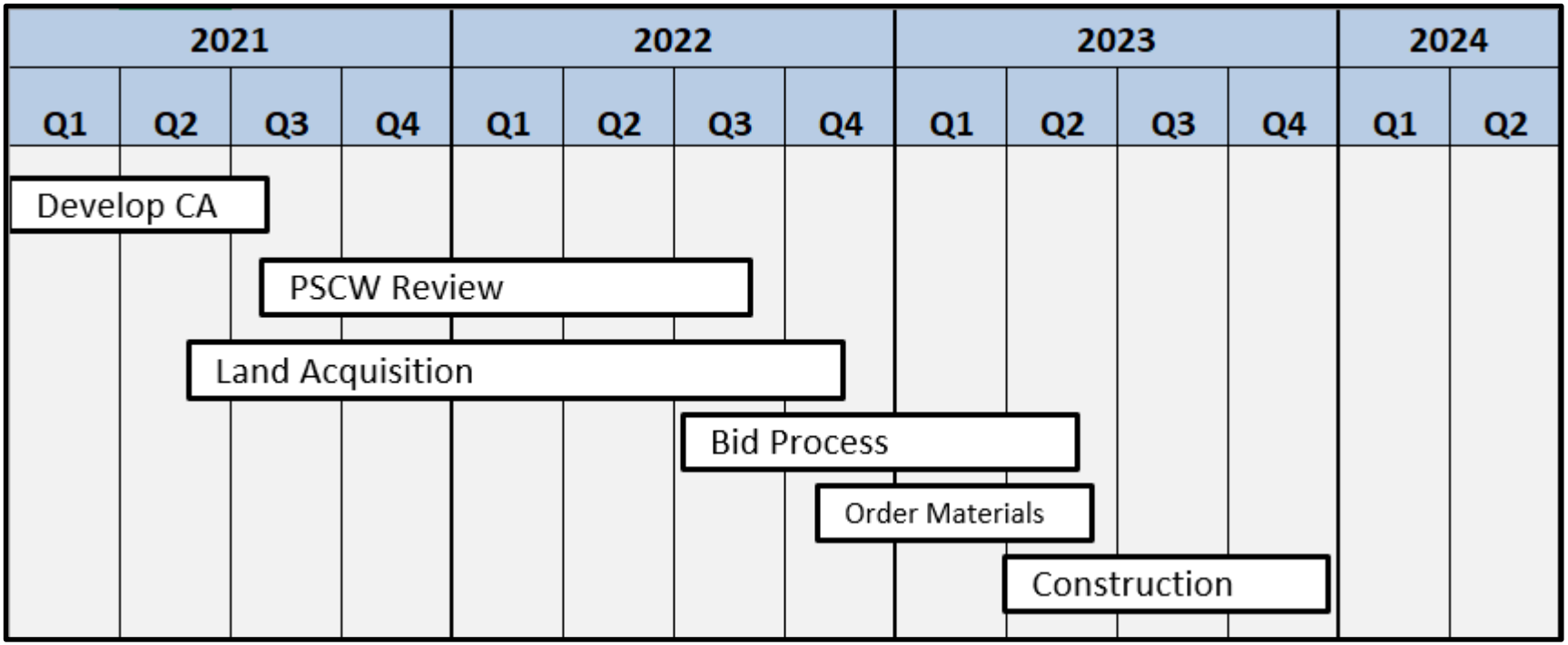
Target In Service December 15, 2023

Project Execution – Contracts

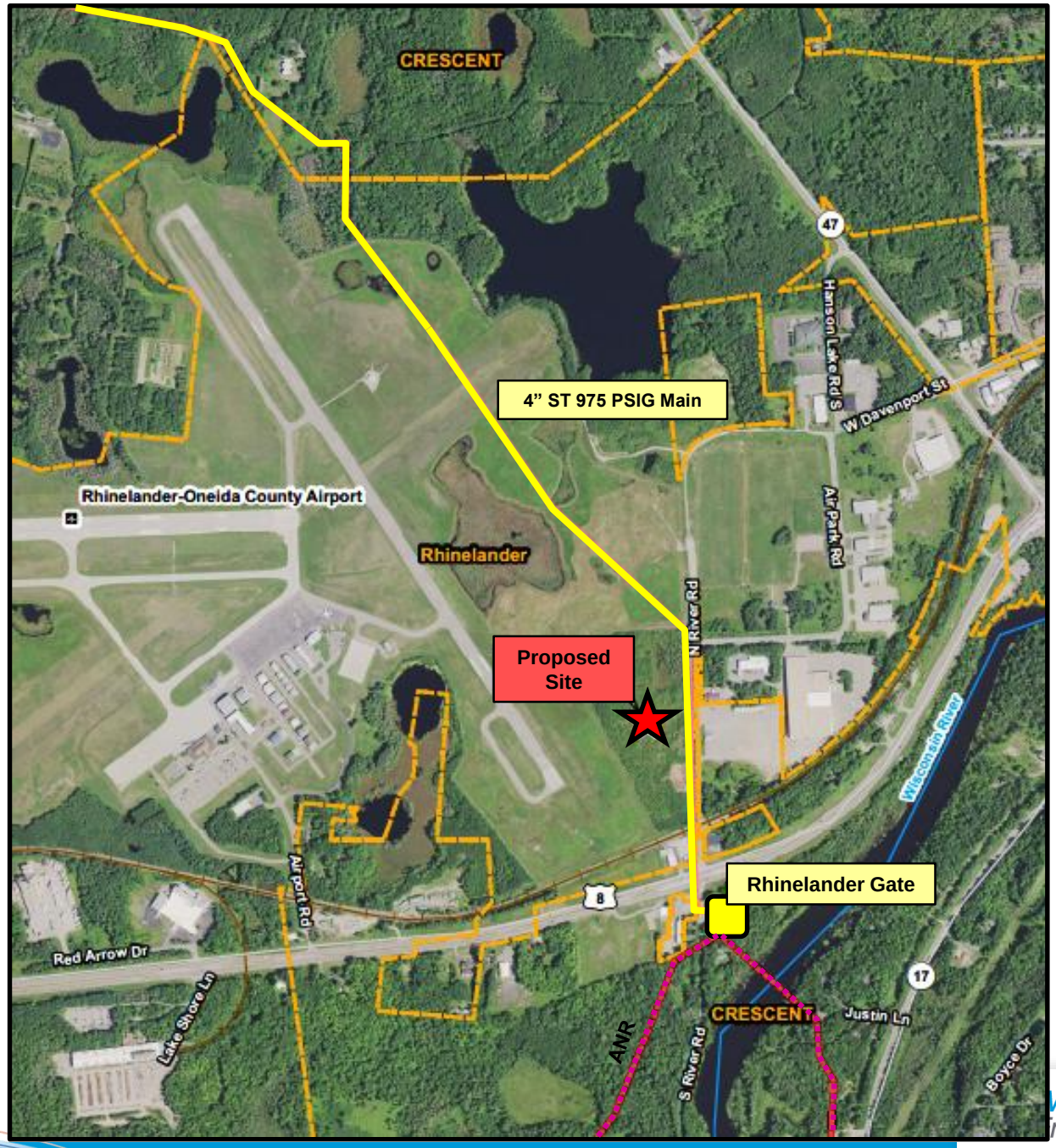
- **Equipment Material Supply Contracts – 21**
  - PEMB
  - Compressor
  - Electrical Equipment
- **Construction Contracts – 4**
  - Civil
  - Mechanical Underground (Code Piping)
  - Mechanical Above Ground
  - Electrical
- **Other Service Contracts – 2**
  - Inspection
  - Training

Project Schedule

Rhinelander Compressor Project



Proposed Site



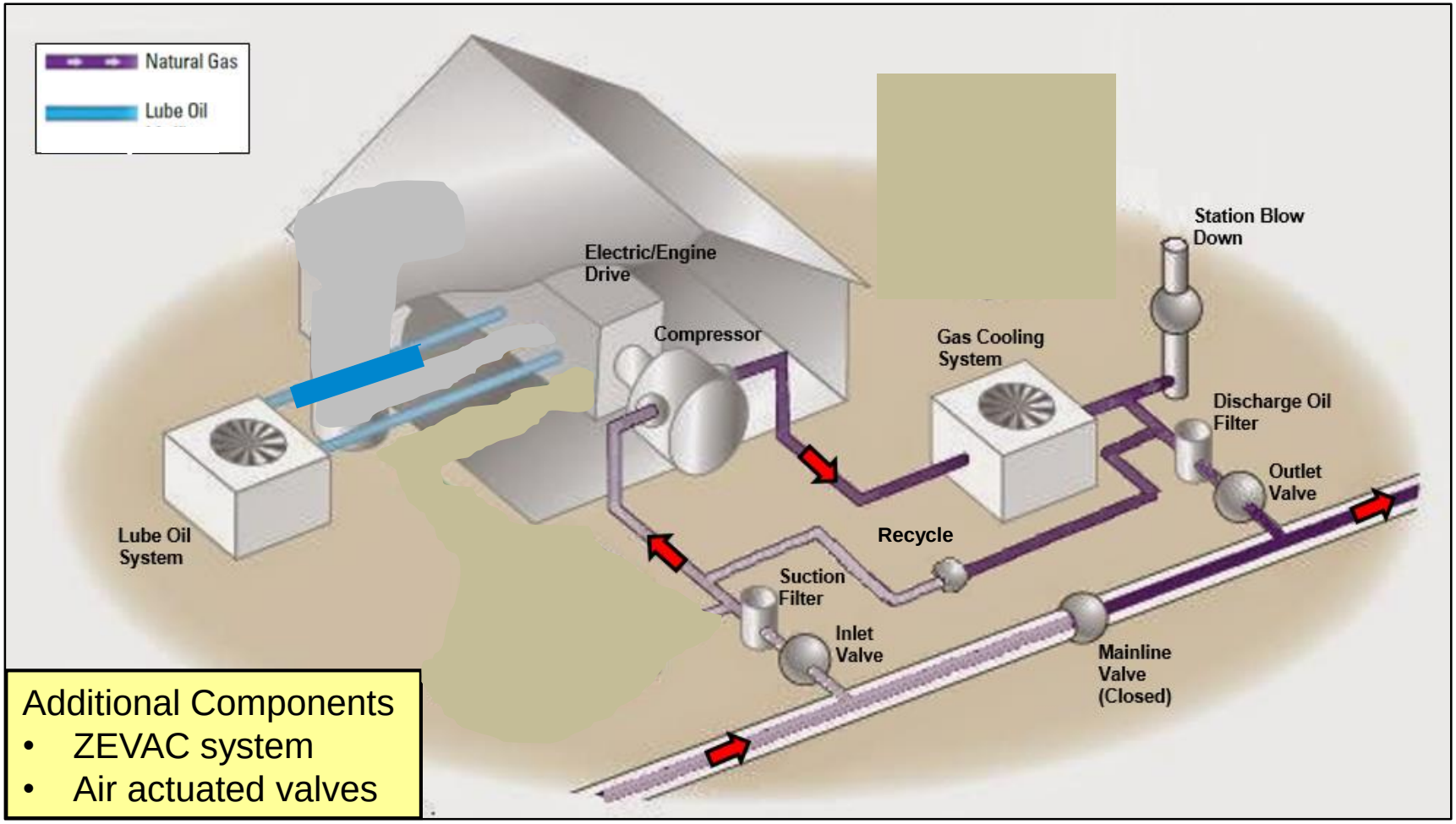
Air Park Rd


CITY OF RHINELANDER
CITY OF RHINELANDER
CITY OF RHINELANDER
ONEIDA COUNTY
PETCO WELL-NESS LLC
New 4" ST
975 PSIG
Main & Valve
PETCO WELL-NESS LLC
CITY OF RHINELANDER
ONEIDA COUNTY
Air Park Rd
PETCO WELL-NESS LLC
CITY OF RHINELANDER
CITY OF RHINELANDER
Project Property
Existing 975 PSIG Main
Existing 60 PSIG Distribution Main
Parcel
Building/Equipment
Distribution Gas Service
Preliminary Electric Service
Driveway
Fence
Project Footprint
Station Piping
NORTH
0 75 150
Feet
Wisconsin Public Service
Appendix A
Attachment 2
Rhinelander
Compressor Station
Site Map
Oneida County, Wisconsin

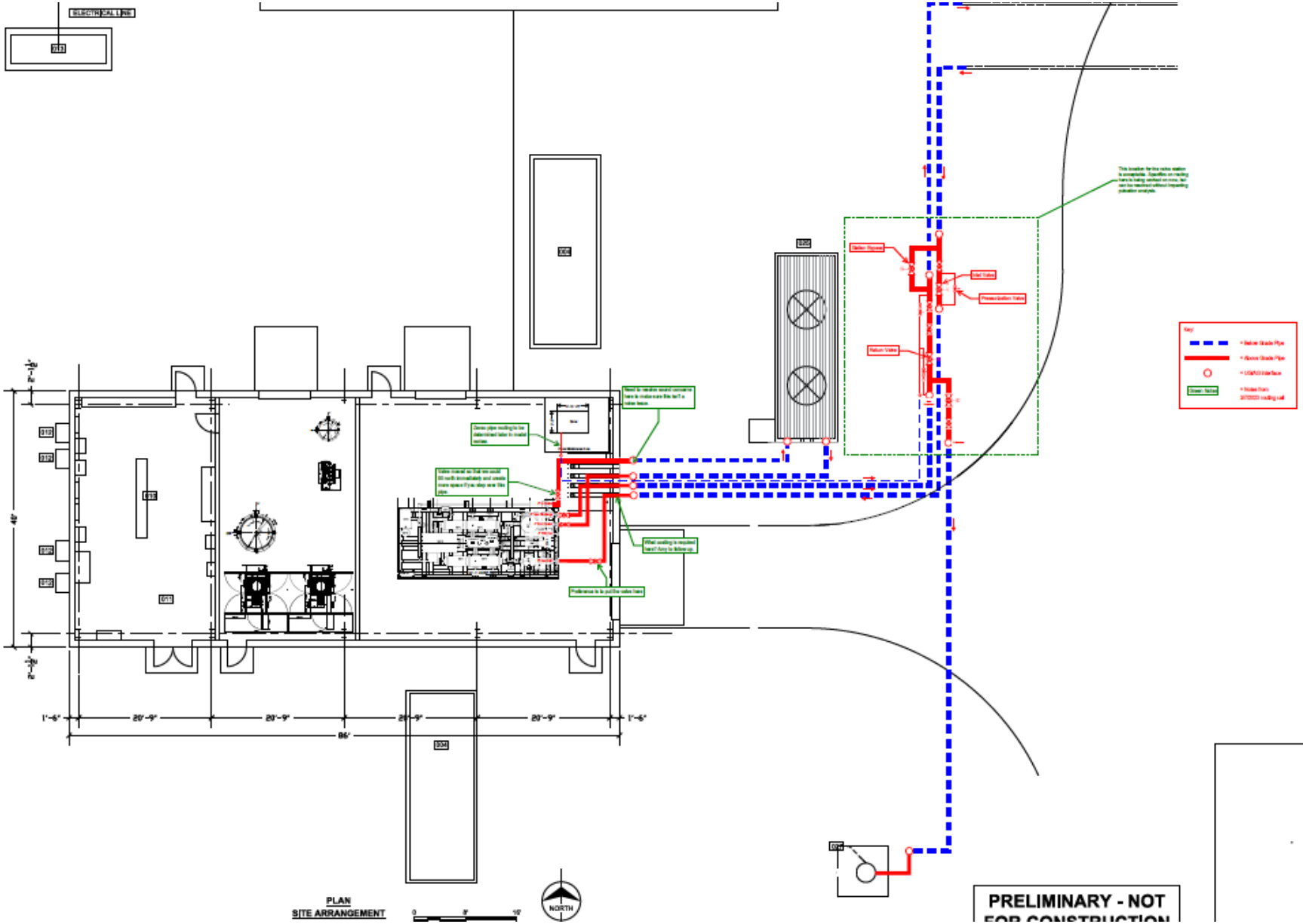
Site Rendering

Preliminary site rendering not for construction.

Compressor Station Process



Additional Components
- ZEVAC system
- Air actuated valves


ELECTRICAL LINE
PLAN
SITE ARRANGEMENT
NORTH
PRELIMINARY - NOT

Base Design Assumptions

- “Peaker” Facility
- Unmanned Facility
- Monitoring via Gas Control
- Remote Operation via Gas Control
- Outlet Pressure Control
- Location Relative to Airport

Technology Options Analyzed

- Gas Turbine Driven Centrifugal Compressor
- Electric Driven Reciprocating Compressor
- Electric Driven w/ VFD Reciprocating Compressor
- Engine Driven Reciprocating Compressor

Evaluation Criteria

- Ability to Meet Operating Conditions
- Capital Cost
- O&M Cost
- Minimal Maintenance & On-site Intervention
- Noise
- Permitting
- Reliability/Availability

Gas Turbine Driven Centrifugal Compressor (or other drive)

- Highest Capital Cost
- Not Suited for Flow and Pressure Requirements (Standard Units Too Large)

Not Recommended

Reciprocating Compressor (Either Drive)

- Well Suited for Operating Conditions
- Readily Available – Standard Sizing
- Proven Reliable Configurations

Drive Comparisons for Reciprocating Compressor

Electric Pro's

- Lower Capital
- Lower O&M
- "Less Complex"
- Lower Noise
- Higher Equipment Availability (not including electric supply)
- No Air Permitting Needed

Engine Pro's

- Higher Overall Availability (due to ability to add a back-up generator)
- Will continue to run in a power outage

Final Selection – Electric Drive Compressor

Due to the low risk of an electric outage occurring at the same time that the compressor will be needed….the team recommends

Electric Driven Reciprocating Compressor

Note: Further evaluation occurred on the benefits of a VFD.

VFD was selected as it, along with a recycle valve, helps the compression equipment meet the various operating cases. VFD was approximately $200k more capital cost versus electric motor alone.

Electric Drive Reciprocating Compressor

- Lower Capital Cost (~30%)
- Electric Reliability in Area
- Added VFD and Recycle Valve to meet a much wider range of operating

Other Major Design Decisions

- Open Compressor in Building or Enclosed Compressor – Building
  - Should gas compressor go in enclosure or building?
- Emergency Shutdown Down (not code required) – Included
  - Should we include an emergency blowdown capability (not required by code technically)?
- Venting After Normal Shutdown – Cross Compression (Zevac)
  - Concern with GHG Emissions every time we have to blow down and also proximity to the airport
  - For the compressor room to have Class 1, Div 2 classification, Makeup Air Units have to run when gas is in piping. How do we get the gas either back into the pipeline or to atmosphere to avoid running the MAUs when compressor is not out of season?
- NG or Air Operated Valves – Air Operated
  - Should we use natural gas for power gas to valves or compressed air?

Other Design Decisions

- Operator Qualification Considerations for High Pressure
  - Had to work with Burns and McDonnell to make sure they followed our standards/procedures in the design and construction of the facility
- How do we ensure the valves fail safely in the event of an emergency?
- What should the valve configuration look like in case of emergency?
  - Actuation needs, overrides in case actuator fails
  - Check valve needed?
- What is needed for compressed air system?
- What kind of communications is needed for site?
- Power needs? Distribution gas needs?
- Do we need a standby generator or not?

Other Design Decisions

- Training for WPS personnel and local fire departments?
- FAA permitting and what kind of notifications needed by airport?
  - Height restriction and notification if crane onsite
- Noise Concerns?
- Modeling for methane plume from blowdown silencer in case of ESD (any concern for airspace)?
- HVAC needs for different rooms
- Plowing concerns in driveway design

Other Design Decisions

- Slurry mixture for riser elbows to avoid settling?
- Pipe support considerations (need to be able to inspect the piping)
- Pulsation study and pipe support redesigns
- Pipe Coating
  - Typical Coating Systems used by GDAM are only rated for 140 degrees F or less
  - SCC Concerns
  - Some operating cases had temperatures of 203 °F at 50 °F station inlet temperature.
  - Had to use 30 mils of FBE coating on pipe and some special high temperature wrap options for fittings
  - Had to get special aboveground paint system for high temperature
  - Designed all piping inside the actuated valves to be good for higher temperatures in case gas cooler fans fail (can run like this for two days per manufacturer without disbonding coating)

Compliance Items

- Higher Temperature Requirements for Coating and Paint
- New Design & Construction Procedures
- New Operation & Maintenance Procedures
- New/Additional Operator Qualifications
- New Monthly/Annual Inspection Procedures

Training Items

- Compressor Operational Training
- Equipment O&M Training
- Control System Training
- Local First Responders

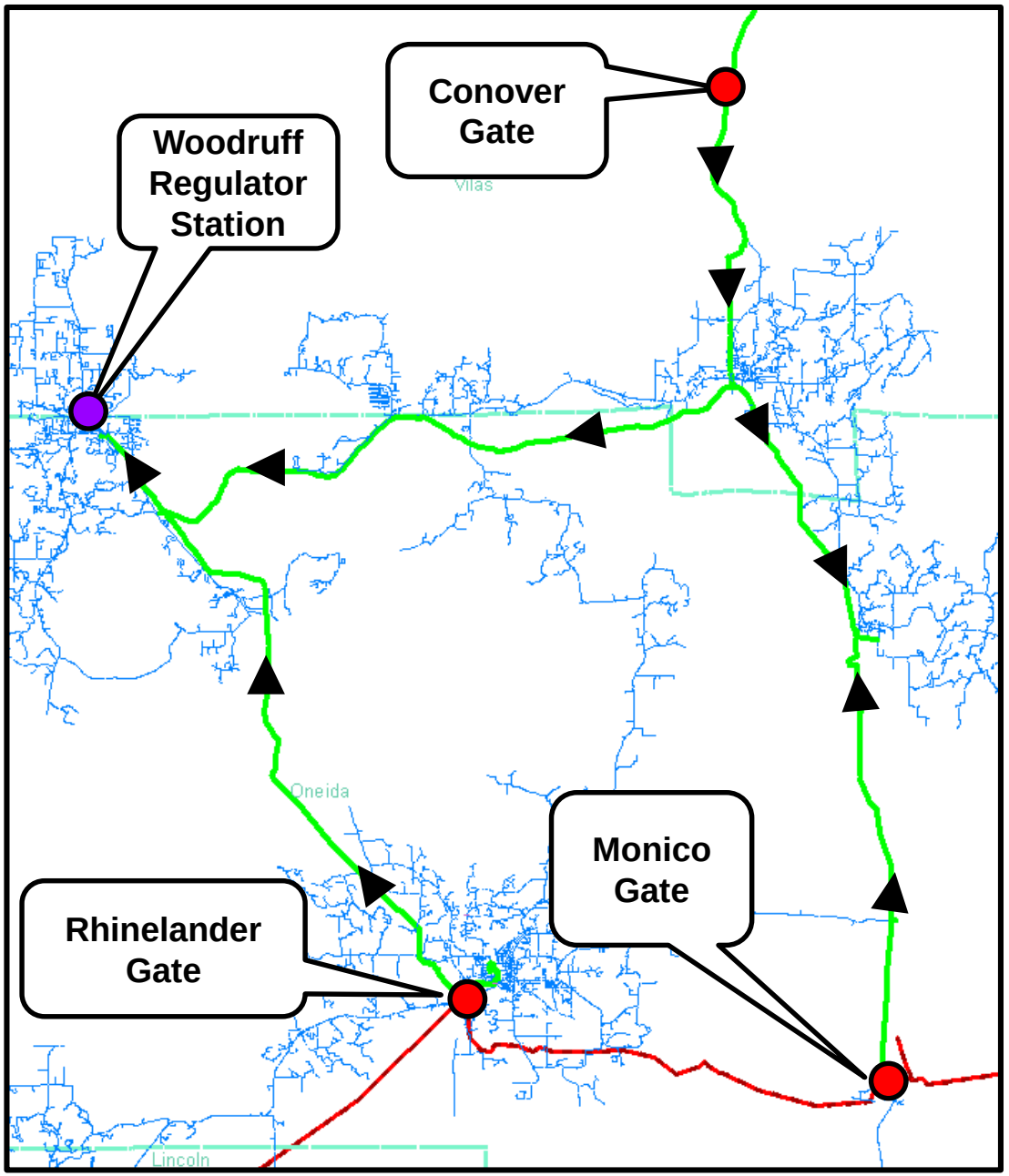
Operating Plan

- Now that we have it, when do we use it?
  - **GAS CONTROL** Tasks
    - Monitor Pressure Telemeters
    - Provide Trends for Pressures and Flows
  - **ENGINEERING** Tasks
    - Review trends
    - Recommendation provided to GAS CONTROL
      - Flow Chart used to Assist

Operating Plan

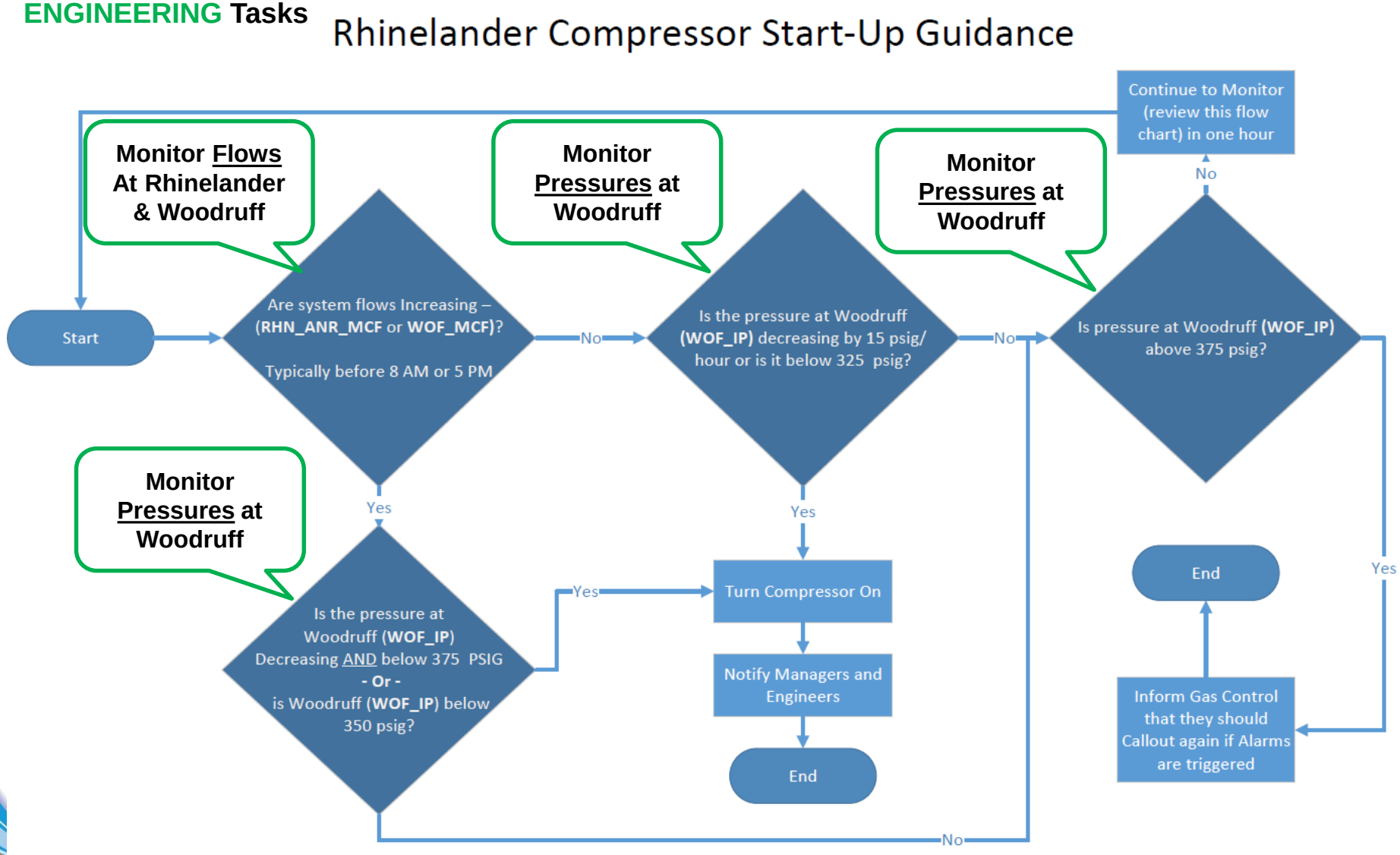
GAS CONTROL Tasks

- Monitor the Inlet Pressure at Rhinelander Gate
- Monitor the Inlet Pressure at Woodruff Regulator Station
  - Predicted Low Pressure on the System
- Goal: Maintain pressures at Woodruff Regulator Station at 300 psig or higher.



Operating Plan

ENGINEERING Tasks



Site Construction

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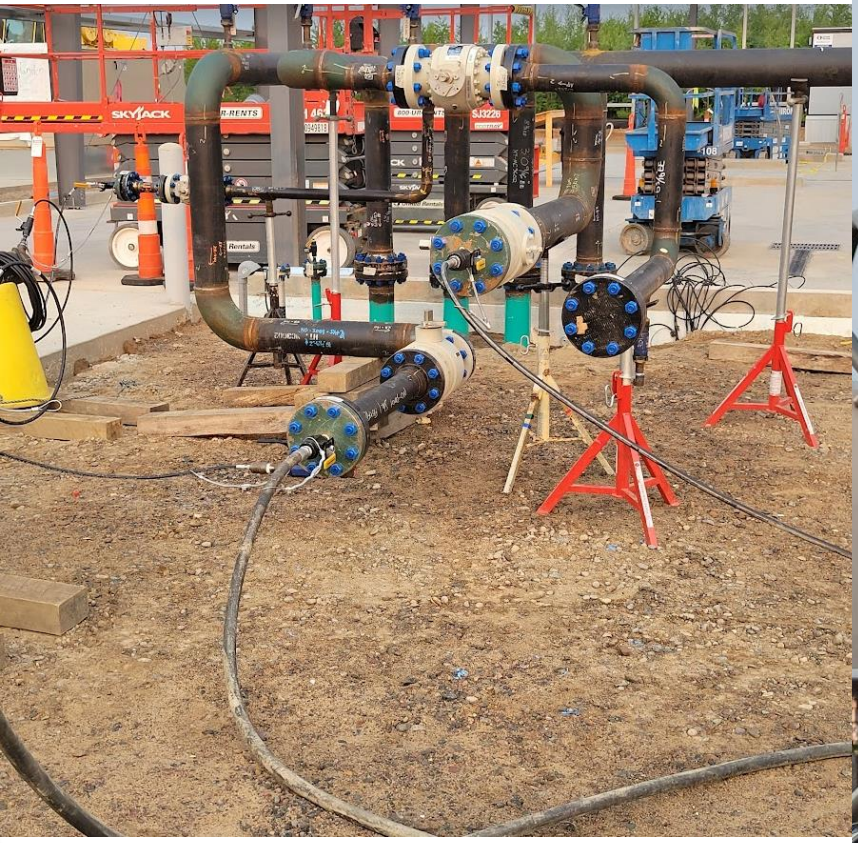

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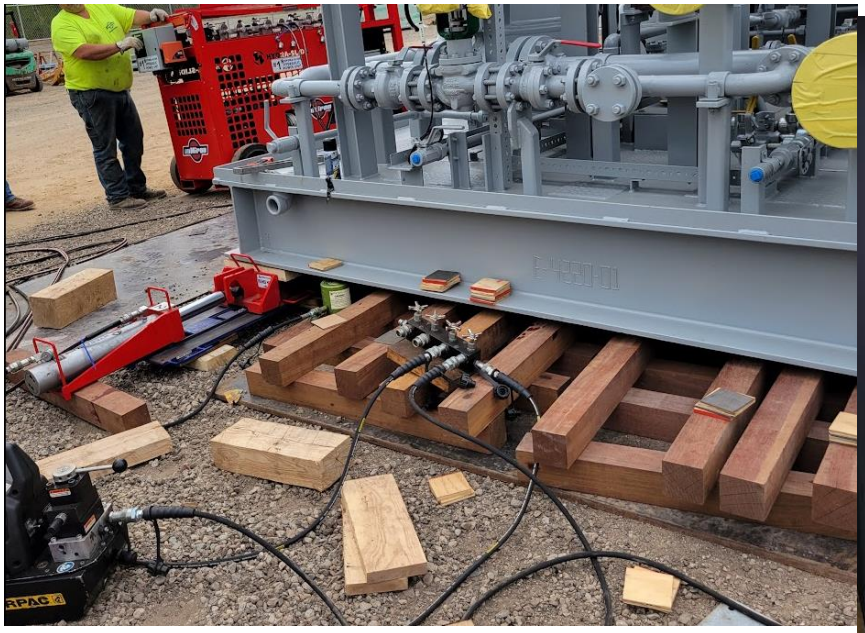

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Site Photo

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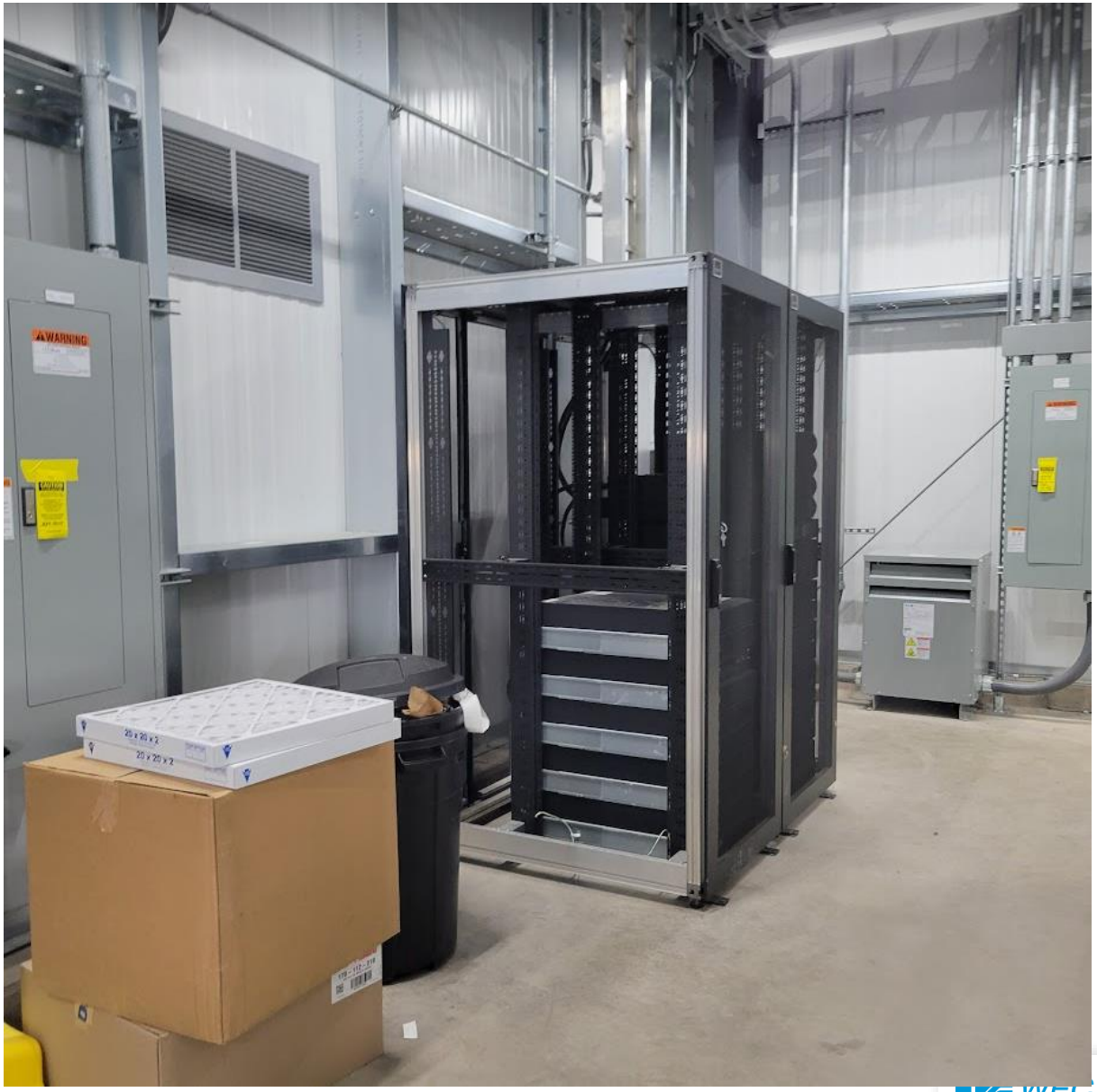

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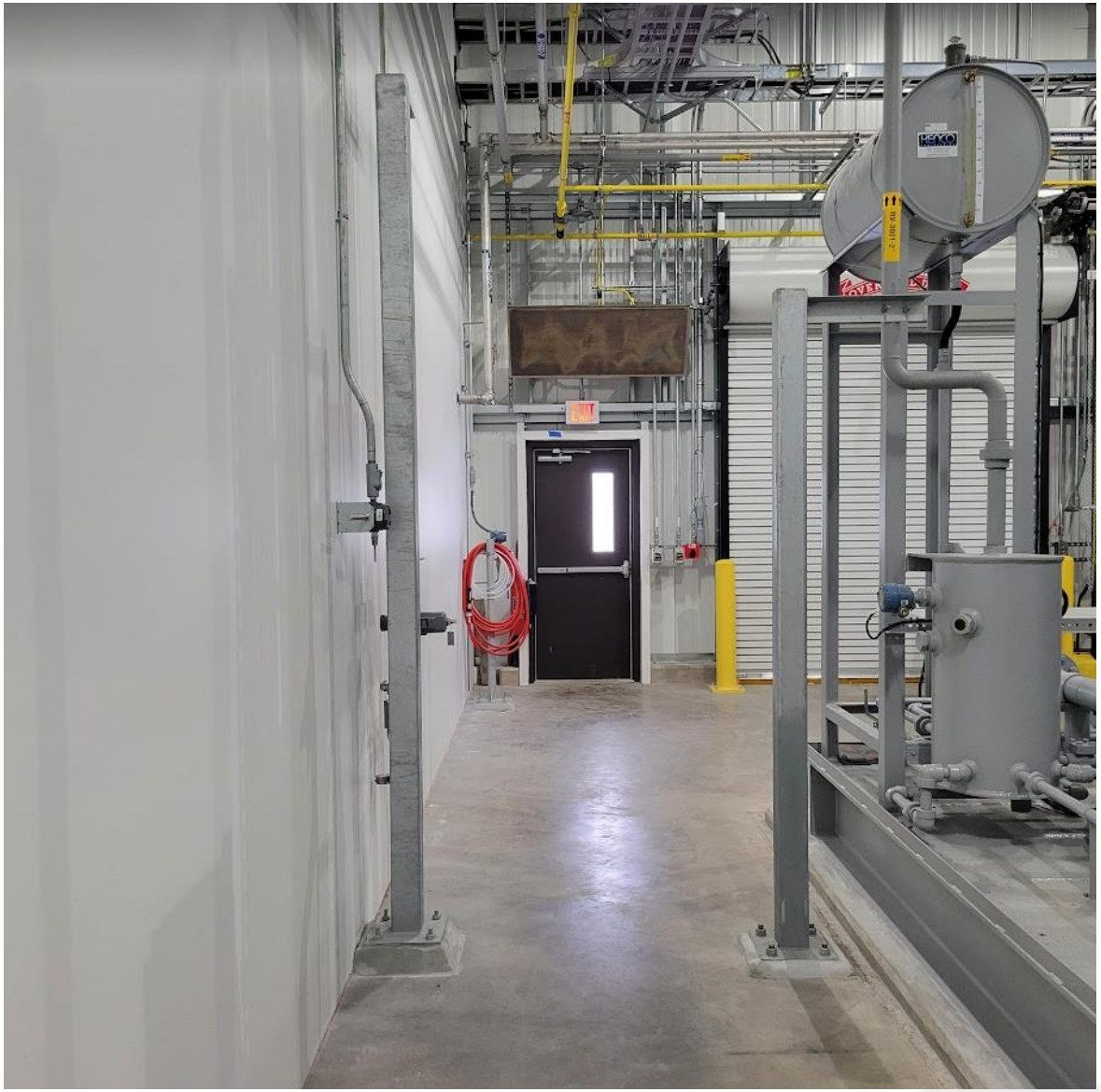

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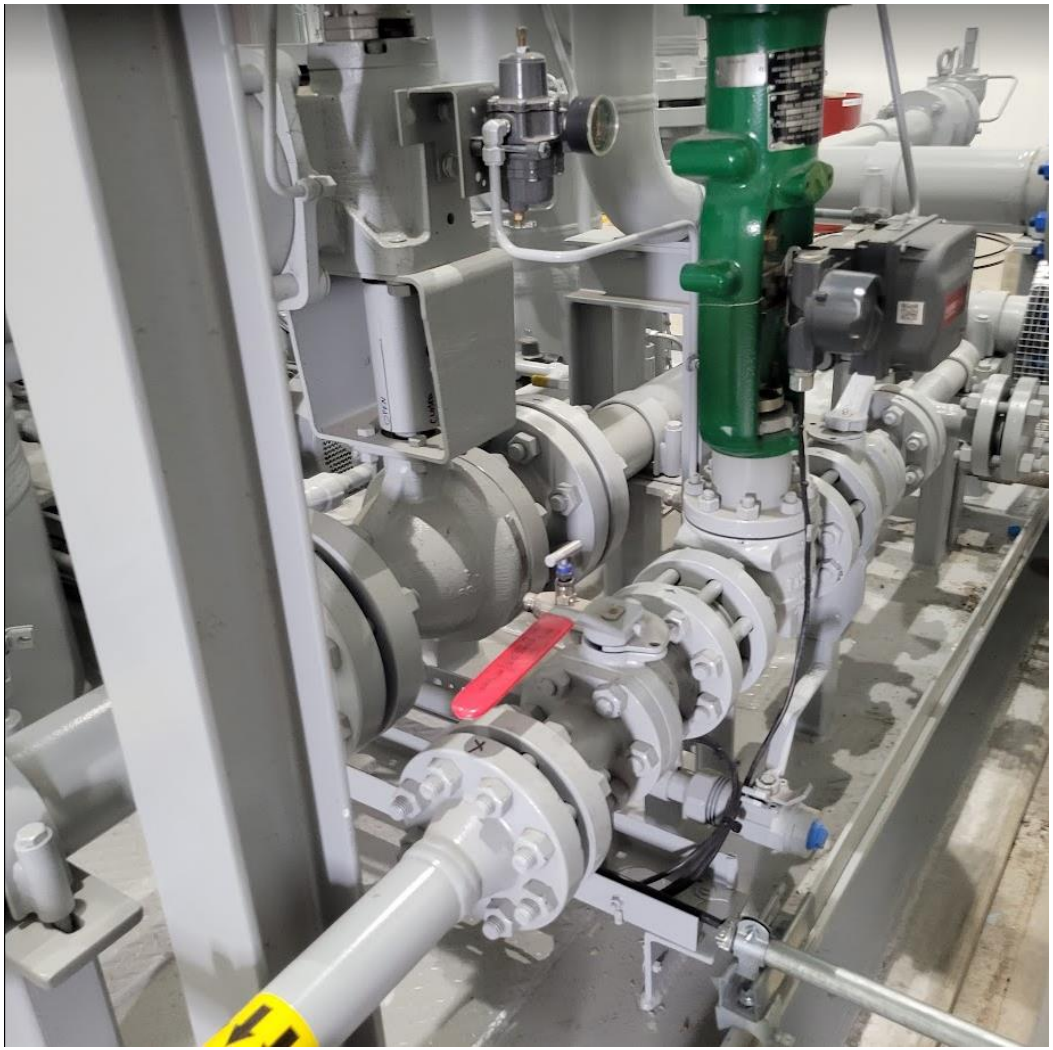

Site Photo

Site Photo

Site Photo

Summary

- Gas supply shortage identified
- Projects proposed to close gap
- WPS compressor project chosen
- Suitable site identified
- Technology options identified
- Electric Driven Reciprocating Compressor Selected
- Construction
- Implement operating plan

Questions?

WEC Energy Group